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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

GEISEL, KARA E

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/976,579

Applicant(s)

AMARTUR, SUNDAR

Examiner

Kara E Geisel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 12-20 is/are rejected.
- 7) ☒ Claim(s) 10 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed on November 6th, 2002 has been fully considered by the examiner.

Specification

The disclosure is objected to because of the following informalities: minor errors.

On page 1, line 11, a patent application number is missing.

On page 15, line 11, a patent application number is missing.

Appropriate correction is required.

Claim Objections

Claim 12 is objected to because of the following informalities: minor typographical error.

In regards to claim 12, line 7, "extrapolating" should be changed to --extrapolates-- in order to clarify the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9, and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ushio (USPN 6,271,047) in view of Witzgall et al. (US Pub 2002/0065664).

In regards to claims 1 and 12, Ushio discloses a method and apparatus for detecting an endpoint during a CMP process (column 1, lines 7-15) comprising a broad band light source for illuminating a

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portion of a surface of a wafer (fig. 3, 19, column 11, lines 57-64), an optical detector for receiving reflected spectrum data sample comprising a plurality of values corresponding to a plurality of spectrums of light reflected from the illuminated portion of the surface of the wafer (fig. 3, 24, column 14, lines 42-67), and logic that determines an endpoint based on optical interference occurring in the reflected spectrum data (column 17-18, lines 50-67 and 1-18). Ushio does not disclose that the apparatus comprises logic that extrapolates outside spectrum data using a linear combination of the values of the reflected spectrum data.

Witzgall teaches a method for processing a signal, called reduced rank autoregressive model, which can be used to process a signal which contains noise and interference (page 1, ¶ 2). This signal processing can be used in spectrographic analysis of a signal such as the signal used for endpoint detection of a CMP process in Ushio's system (page 1, ¶ 5). In this method, Witzgall extrapolates outside spectrum data using a linear combination of the values of the reflected spectrum data sample (page 1, ¶ 7). This is done in order to better process data in a rapidly changing environment, and to increase resolution of the data obtained (page 8, ¶ 98). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add this signal processing system into Ushio's endpoint detection system in order to better process data in a rapidly changing environment, and to increase resolution of the data obtained.

In regards to claims 2 and 13, the combined system further comprises decomposing the reflected spectrum data sample into noise sub-space values and signal sub-space values (Witzgall pages 3-4, ¶s 42-44).

In regards to claims 3 and 14, the sample is decomposed using singular value decomposition (Witzgall page 5, ¶ 64).

In regards to claims 4 and 15-17, the combined system further comprises the operation of truncating the noise sub-space values (Witzgall page 2, ¶ 23).

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In regards to claims 5 and 18, the optical interference is a result of phase differences in light reflected from different layers of the wafer (Ushio column 11, lines 9-30).

In regards to claim 6, optical interference occurs when a top metal layer is reduced to a thin metal zone (Ushio column 13, lines 39-55).

In regards to claims 7 and 19, the method further comprises the operation of determining when oscillations occur in a plot of wave numbers based on the reflected spectrum data (Ushio columns 13-14, lines 58-67 and 1-20, respectively).

In regards to claim 8 and 20, endpoint occurs when the oscillations in the plot of wave numbers occurs (Ushio column 14, lines 7-20).

In regards to claim 9, the combined system further comprises the operation of obtaining linear prediction power data in a defined spectral range based on the wave numbers (Witzgall page 3, ¶s 40-42).

Allowable Subject Matter

Claims 10-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claim 10, the prior art of record, taken alone or in combination, fails to disclose or render obvious a method for detecting an endpoint during a CMP process comprising calculating a sum of peak magnitudes occurring in the linear prediction power data, in combination with the rest of the limitations of claim 10.

Additional Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art made of record is Abatzoglou et al (USPN 5,748,507), and Kauppinen (USPN 5,400,265).

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Abatzoglou discloses a data processing system that uses linear prediction and decomposes a sample using singular value decomposition in order to improve the resolution of a signal real time.

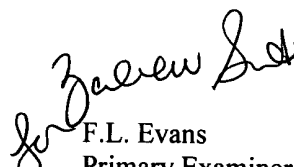
Kauppinen discloses a data processing system that uses linear combination of a spectrum data sample to extrapolate outside spectrum data. This system uses linear prediction to increase the resolution of a signal.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kara E Geisel whose telephone number is 703 305 7182. The examiner can normally be reached on Monday through Friday, 8am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 703 308 4881. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872 9318 for regular communications and 703 872 9319 for After Final communications. For inquiries of a general nature, the Customer Service fax number is 703 872 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 1782.


F.L. Evans
Primary Examiner
Art Unit 2877

KEG
June 19, 2003